Check List the journal of biodiversity data

NOTES ON GEOGRAPHIC DISTRIBUTION

Check List 12(4): 1922, 12 July 2016 doi: http://dx.doi.org/10.15560/12.4.1922
ISSN 1809-127X © 2016 Check List and Authors

Strumigenys fairchildi Brown, 1961 (Formicidae, Myrmicinae): first record of this rarely collected ant from Brazil

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Abstract: *Strumigenys fairchildi* Brown, 1961 is recorded for the first time in Brazil. This ant species was previously known only from a few specimens collected in Costa Rica, Panama and Ecuador. The worker *S. fairchildi* was collected at the Parque Estadual do Cristalino, a continuous area of Amazon tropical rain forest protected for biodiversity conservation in the municipality of Novo Mundo, Mato Grosso state. In addition, we present a distribution map and high-resolution images of the worker.

Key words: Amazon basin; Brazilian ant fauna; distribution; Formicidae; Neotropical ants

The ant genus *Strumigenys* Smith, 1860 (Formicidae: Myrmicinae), found worldwide, is represented by 838 extant species, and four fossil species (AntWeb 2016); 25% of the species occur in the Neotropics (Lattke and Aguirre 2015). Most species of this genus occur in tropical rainforest, some in grassland and scrub, usually nesting in soil and rotting wood, though a few species live in arboreal cavities in tropical rain forest (Brown and Wilson 1959; Bolton 2000). Besides the most common form of reproductive females (gyne) some species of *Strumigenys* have the ergatoid forms (Silva and Brandão 2014). Species of the genus are predators of Collembola, mites, insect larvae, and other small arthropods (Wilson 1953; Hölldobler and Wilson 1990; Bolton 1999; Kaufmann et al. 2003), although, some few species occasionally feed on sugary substances (Brown and Wilson 1959). To capture their prey, some species use a kinetic mode of attack (Gronenberg 1996; Bolton 1999).

Despite being a relatively speciose genus and commonly sampled in biodiversity surveys (Morini et al. 2007; Silva et al. 2007; Suguituru et al. 2013; Ulysséa and Brandão 2013; Camacho and Vasconcelos 2015; Souza et al. 2015) most species records are based upon a few specimens (Bolton 2000), as is the case with *S. fairchildi* Brown, 1961. *Strumigenys fairchildi* belongs to the *tococae*-group (comprised by *S. anthocera* Lattke & Goitía, *S. extirpa* Bolton, *S. fairchildi* Brown, *S. tococae* Wheeler & Bequaert, and *S. usbensis* Lattke & Goitía) and was originally described based on one worker collected in Panama (Brown 1961). Since then, the species has been recorded in Costa Rica (Bolton 2000) and most recently in Ecuador (Salázar et al. 2015). In the present paper we report the first record of *S. fairchildi* in Brazil, considerably extending the distribution limits for the species.

One *S. fairchildi* worker (Figure 1) was collected in November 2013, during the beginning of the rainy season in a protected area for biodiversity conservation of the Parque Estadual do Cristalino (Figure 2), a continuous pristine forest in the Novo Mundo municipality, of Mato Grosso state (09°28′ S, 055°50′ W). In this region, known as the Arc of Deforestation (Michalski et al. 2008), the ant fauna is still not very well known with just a few studies contributing to expand our knowledge of the distribution of some rarely collected species (Vicente et al. 2011, 2012, 2015). According to the Köppen classification, the climate in this region is characterized as tropical humid (Am) with a mean annual temperature of 25°C and an annual precipitation ranging from 2,800 mm to 3,100 mm (Alvares et al. 2013). There are two well-defined seasons, a rainy season between November

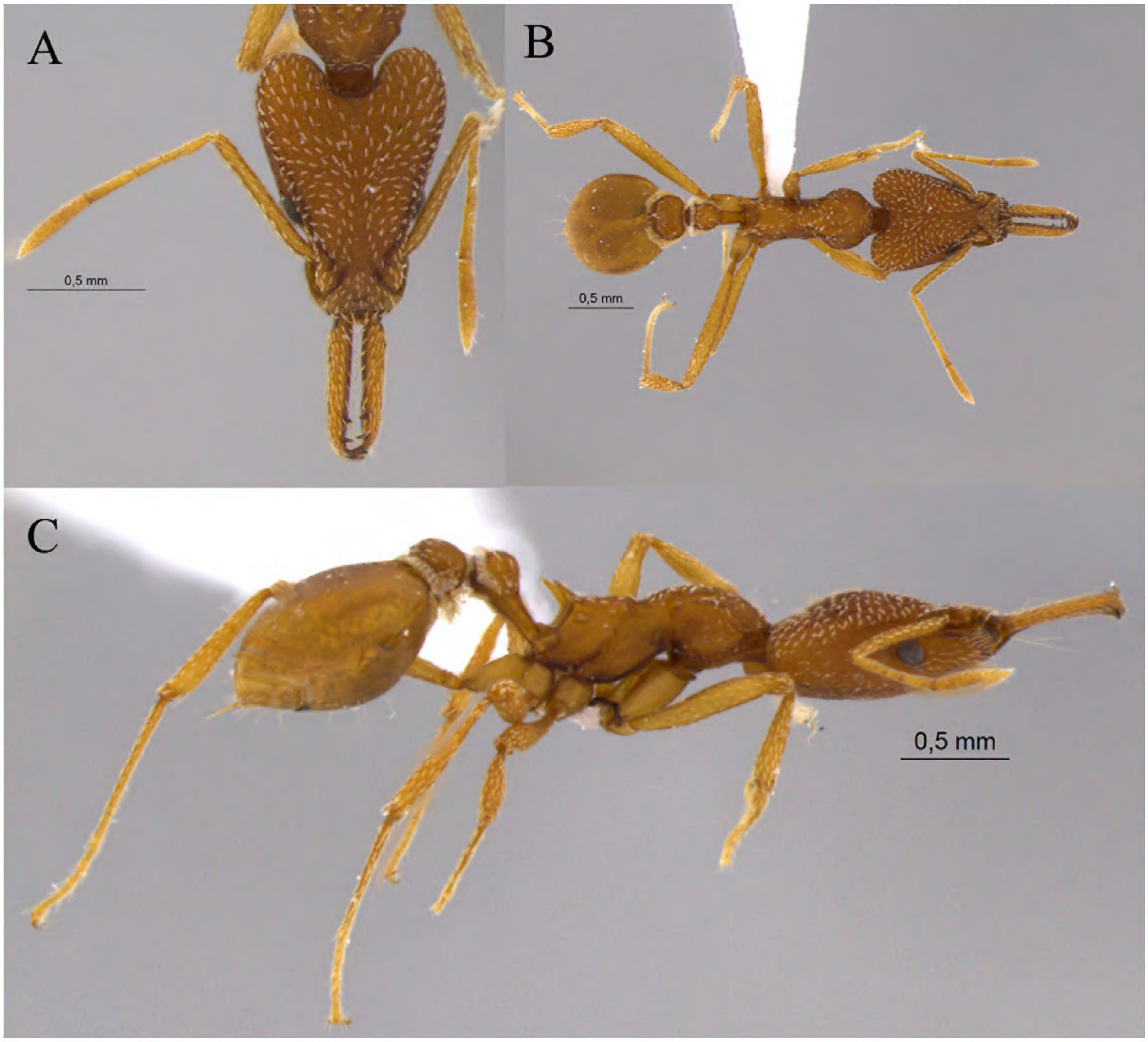

Figure 1. Worker of *Strumigenys fairchildi* from Mato Grosso, Brazil in full-face view (**A**), dorsal view (**B**) and lateral view (**C**).

and April and a dry season between May and October (Vicente et al. 2014). The local altitude ranges from 100 to 400 m above sea level and the vegetation is classified as Open Ombrophilous Forest and ecological tension zones between the Ombrophilous Forest and Savanna (Cerrado), Savanna and Seasonal Forest, Seasonal Forest and Ombrophilous Forest (Instituto Brasileiro de Geografia e Estatística 2004). The specimen was collected in understory vegetation (plants 1–3 m high) using a beating tray in one trail of the Research Program in Biodiversity (Programa de Pesquisas em Biodiversidade, PPBio grid 09°28′29.2″ S, 055°50′00.2″ W, altitude 304 m as estimated in Google Earth™).

The specimen is deposited in the ant collection of the Laboratório de Sistemática, Evolução e Biologia de Hymenoptera of the Museu de Zoologia da Universidade de São Paulo (MZSP), SP, Brazil (the ant collection of the MZSP does not have numerical identifiers, therefore, the author's number is REV_Strumi001). It was photographed with a Leica Application Suite V3 system at the MZSP and edited in Adobe Photoshop© version 7.0. The distribution map was generated using the Quantum GIS 2.6.0 software, with shapes available at Natural Earth, the coordinates were imported from Google Earth™ after consulting the records for *S. fairchildi* in the literature (Bolton 2000; Salazar et al. 2015).

To identify *Strumigenys* ant species we used the taxonomic key provided by Bolton (2000). According to Bolton (2000), *S. fairchildi* (Figure 1) is morphologically characterized by the combination of (1) first gastral tergite finely and very densely longitudinally costulate-striolate; (2) surface of this sclerite with minute inconspicuous appressed pubescence only, without spatulate hairs such as are present on the cephalic

dorsum but with a few scattered flagellate hairs that are extremely fine, easily broken or lost; (3) apicoscrobal hair absent; (4) maximum diameter of eye ca 0.14; (5) propodeum in profile with a pair of long spines at top of declivity; (6) base of declivity with a pair of much shorter acute teeth that are narrowly triangular; (7) ventral surface of petiole with a narrow continuous strip of spongiform tissue.

The intraspecific morphological variability observed in specimens collected in Brazil and Costa Rica are variations in patterns of pilosity of the cephalic dorsum, waist and gaster. In addition, the body color is variable; the specimen collected in Brazil is slightly darker than the specimen collected in the Costa Rica.

Morphologically, *S. fairchildi* is very similar to *S. anthocera* and *S. usbensis*, species with a possible overlapping distribution. This species differs from the first by the apicoscrobal hair (absent in *S. fairchildi* and present in *S. anthocera*) and by the length of the spine at the propodeal lobe (shorter than the dorsal propodeal spine in *S. fairchildi* and as long as the dorsal propodeal spine in *S. anthocera*). In addition, *S. usbensis* differs from *S. fairchildi* by the modifications of the spongiform tissue on the ventral surface of the petiole (present in *S. fairchildi* and absent in *S. usbensis*) and shape of hairs in the first gastral surface (flagellate hairs in *S. fairchildi* and spatulate hairs in *S. usbensis*).

Strumigenys fairchildi (Figure 1) was previously recorded in Cerro Campana, Panama (Brown 1961), Heredia province, Costa Rica (Bolton 2000) and recently in Sucumbios province, Ecuador (Salazar et al. 2015) (Figure 2). The new record of this work expands its occurrence to Parque Estadual do Cristalino (09°28′S, 055°50′W), a continuous Amazonian forest in the Novo Mundo municipality, of Mato Grosso state, Brazil (Figure 2). This is more than 2,000 km from the nearest record of this species.

Despite growing knowledge about the diversity of Neotropical ants (Silva et al. 2013; Baccaro et al. 2015; Bezděčková et al. 2015; Brandão et al. 2015; Delabie et al. 2015; Salazar et al. 2015), the distribution of many species, especially those primarily associated with the Amazonian biome, is still virtually unknown (Fernandes et al. 2015a, 2015b; Vicente et al. 2011, 2012, 2015). Several ground-dwelling ant inventories have been carried out in what can be now considered the range of *S. fairchildi* (Vasconcelos et al. 2006, 2010; Mertl et al. 2010; Miranda et al. 2012; Ryder-Wilkie et al. 2009; Souza et al. 2016) but they all failed to detect this species. Because *S. fairchildi* lives in vegetation and considering the scarcity of inventories of arboreal ants (but see: Vasconcelos and Vilhena 2006; Ryder-Wilkie

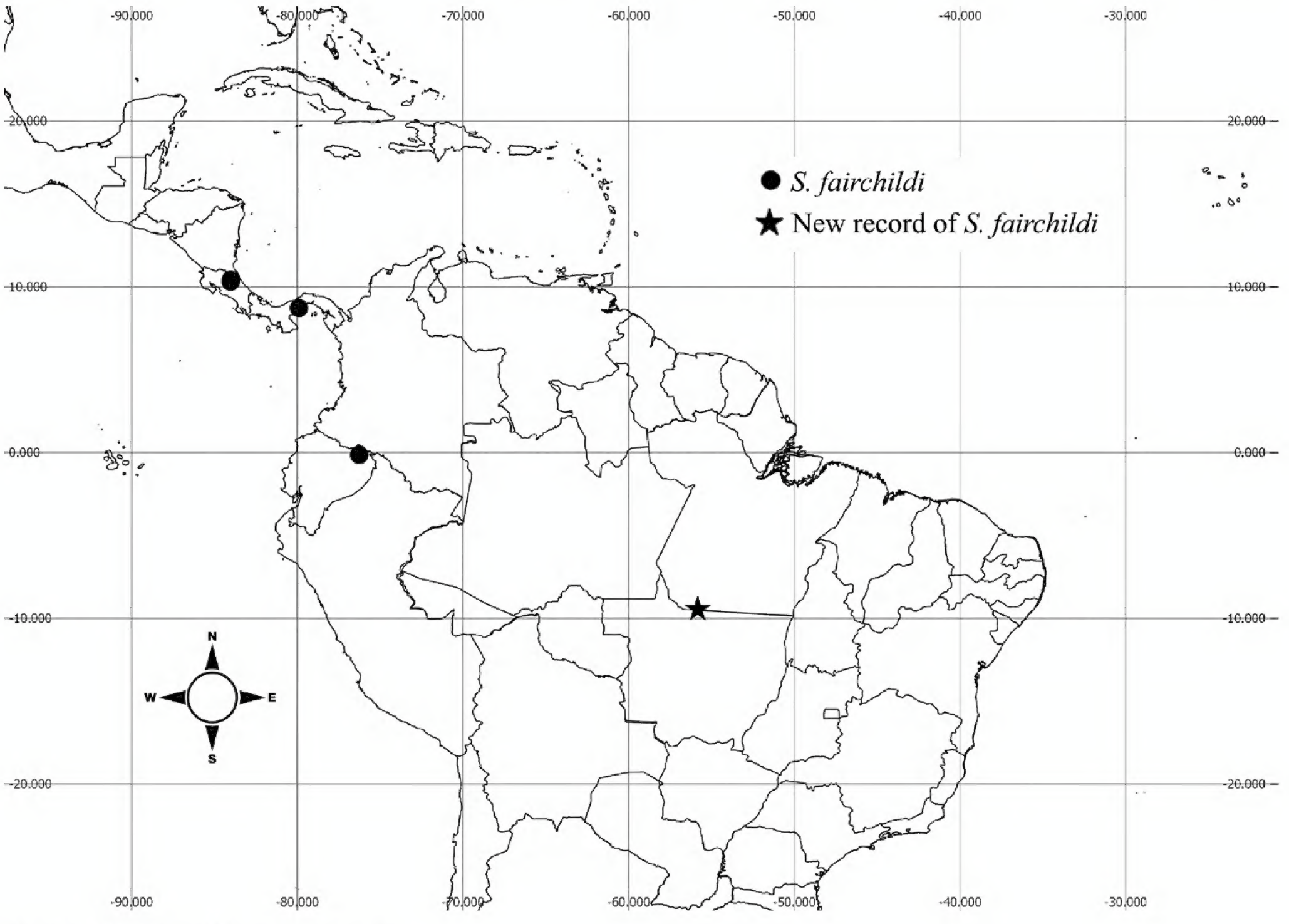

Figure 2. Distribution of *Strumigenys fairchildi*.

et al. 2010), the distribution of this species is probably much broader than reported in the literature.

Furthermore, four ant collections (Museu de Zoologia da Universidade de São Paulo [MZSP], Instituto Nacional de Pesquisas da Amazônia [INPA], Laboratório de Ecologia de Comunidades da Universidade Federal do Mato Grosso [LEC/UFMT] and Collection Padre Jesus Santiago Moure of the Universidade Federal do Paraná [DZUP]) that house a large number of specimens of both the Amazon and Brazilian ant fauna were consulted and no other specimen of *S. fairchildi* was found. Thus, the new record reported here suggests that more sampling efforts applying different techniques of sampling should be used to reveal the distribution of this species and contribute to increase the knowledge of the Brazilian ant fauna that remains underestimated, especially for species that inhabit vegetation strata. As seen in the present paper, the use of beating trays is a viable technique for sampling ants that live and forage in shrubby environments. Available information on niche preference is still scarce for most groups of this family of insects, hampering advances on studies such as behavioral ecology. Applying beating trays as a standardized technique in sampling inventories of ants, in this particular arboreal stratum, will certainly provide useful information to boost studies in disciplines in which knowledge regarding habitat preference is needed, especially in those genera believed to be exclusively epigaeic, such as *Strumigenys*.

ACKNOWLEDGEMENTS

We thank Vinicius Soares and Mariana Silva for the fieldwork support, and Dr. Carlos Roberto F. Brandão (MZSP) for Automontage from MZSP Hymenoptera Lab and Henrique Miranda Rodrigues (CASE) for his help with previous draft. We also would like to thank Secretaria de Estado do Meio Ambiente (SEMA) and the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq numbers 479243/2012–3, 558225/2009-8, 501408/2009-6 and 457466/2012-0) for logistical and financial support. The authors acknowledge their grants from CAPES (REV, LPP and TSRS) and FAPEAM (JLPS). This work is publication 33 in the NEBAM technical series.

LITERATURE CITED

AntWeb. 2016. Genus *Strumigenys*. Accessed at https://www.antweb.org/browse.do?subfamily=myrmicinae&genus=strumigenys&rank=genus&project=allantwebants, 17 May 2016.

Alvares, C.A., J.L. Stape, P.C. Sentelhas, J.L. De-Moraes-Gonçalves and G. Sparovek. 2013. Köppen's climate classification map for Brazil. Meteorologische Zeitschrift 22: 711–728. doi: 10.1127/0941-2948/2013/0507

Baccaro, F.B., R.M. Feitosa, F. Fernández, I.O. Fernandes, T.J. Izzo, J.L.P. Souza and R. Solar. 2015. Guia para os gêneros de formigas do Brasil. Manaus: Editora INPA. 388 pp.

Bezděčková, K., P. Bezděčka and I. Machar. 2015. A checklist of the ants (Hymenoptera: Formicidae) of Peru. Zootaxa 4020(1): 101–133. doi: 10.11646/zootaxa.4020.1.4

Bolton, B. 1999. Ant genera of the tribe Dacetonini (Hymenoptera: Formicidae). Journal of Natural History 3(33): 1639–1689.

Bolton, B. 2000. The ant tribe Dacetini. Memoires of the American Entomological Institute 65: 1–1028.

Brandão, C.R.F., R.M. Feitosa and J.L.M. Diniz. 2015. Taxonomic revision of the Neotropical Myrmicinae ant genus *Blepharidatta* Wheeler. Zootaxa 4012(1): 033–056. doi: 10.11646/zootaxa.4012.1.2

Brown, W.L. 1961. The Neotropical species of the ant genus *Strumigenys* Fr. Smith: miscellaneous concluding studies. Psyche 68: 58–69.

Brown, W.L. and E.O. Wilson. 1959. The evolution of the dacetine ants. The Quarterly Review of Biology 34: 278–294.

Camacho, G.P. and H.L. Vasconcelos. 2015. Ants of the Panga Ecological Station, a Cerrado reserve in central Brazil. Sociobiology. 62: 281–295. doi: 10.13102/sociobiology.v62i2.281-295

Delabie, J.H.C., R.M. Feitosa, J.E. Serrão, C.S.F. Mariano and J.D. Majer (eds.). 2015. As formigas poneromorfas do Brasil. Ilhéus: Editus. 477 pp. doi: 10.5281/zenodo.32400

Fernandes, I.O., J.L.P. Souza, F. Fernandez, J.H.C. Delabie and T.R. Schultz. 2015. A new species of *Simopelta* (Hymenoptera: Formicidae: Ponerinae) from Brazil and Costa Rica. Zootaxa 3956(2): 295–300. doi: 10.11646/zootaxa.3956.2.10

Fernandes, I.O., J.L.P. Souza, J.H.C. Delabie and F. Fernandez. 2015. New records of the Dorylinae ant genus *Cheliomyrmex* for the Brazilian Amazon Basin. Sociobiology 62(1): 128–131. doi: 10.13102/sociobiology.v62i1.128-131

Gronenberg, W. 1996. The trap-jaw mechanism in the Dacetine ants *Daceton armigerum* and *Strumigenys* sp. The Journal of Experimental Biology 199: 2021–2033.

Hölldobler, B. and E.O. Wilson. 1990. The ants. Cambridge, MA: Harvard University Press. 732 pp.

Instituto Brasileiro de Geografia e Estatística. 2004. Mapa da vegetação brasileira. 3ª edição. Ministério do Planejamento, Orçamento e Gestão. Accessed at http://www.obt.inpe.br/prodes/index.php, 12 September 2015.

Kaufmann, E., A.K.F. Malsch, M. Erle and U. Maschwitz. 2003. Compound nesting of *Strumigenys* sp. (Myrmicinae) and *Diacamma* sp. (Ponerinae), and other nesting symbioses of myrmicine and ponerine ants in Southeast Asia. Insectes Sociaux 50: 88–97. doi: 10.1007/s000400300014

Lattke, J.E. and N. Aguirre. 2015. Two new *Strumigenys* F. Smith (Hymenoptera: Formicidae: Myrmicinae) from montane forests of Ecuador. Sociobiology 62: 175–180. doi: 10.13102/sociobiology.v62i2.175-180

Lattke, J.E. and W. Goitía. 1997. El género *Strumigenys* en Venezuela. Caldasia 19: 367–396.

Mertl, A.L., M.D. Sorenson and J.F.A. Traniello. 2010. Community-level interactions and functional ecology of major workers in the hyperdiverse ground-foraging *Pheidole* (Hymenoptera, Formicidae) of Amazonian Ecuador. Insectes Sociaux 54: 441–452. doi: 10.1007/s00040-010-0102-5

Michalski, F., C.A. Peres and I.R. Lake. 2008. Deforestation dynamics in a fragmented region of southern Amazonia: evaluation and future scenarios. Environmental Conservation 35: 93–103. doi: 10.1017/S0376892908004864

Miranda, P.N., M.A. Oliveira, F.B. Baccaro, E.F. Morato and J.H.C. Delabie. 2012. Check list of ground-dwelling ants (Hymenoptera: Formicidae) of the eastern Acre, Amazon, Brazil. Check List 8: 722–730. doi: 10.15560/8.4.722

Morini, M.S.C., C.B. Munhae, R. Leung, D.F. Candiani and J.C. Voltolini. 2007. Comunidades de formigas (Hymenoptera: Formicidae) em fragmentos de Mata Atlântica urbanizados. Iheringia, Série Zoologia 97: 246–252. doi: 10.1590/S0073-47212007000300005

Ryder-Wilkie, K.T., A.L. Mertl and J.F.A. Traniello. 2009. Diversity of ground-dwelling ants (Hymenoptera: Formicidae) in primary

and secondary forests in Amazonian Ecuador. Myrmecological News 12: 139–147.

Ryder-Wilkie, K.T., A.L. Mertl and J.F.A. Traniello. 2010. Species diversity and distribution patterns of the ants of Amazonian Ecuador. PLoS ONE 5(10): e13146. doi: 10.1371/journal.pone.0013146

Salazar, F., F. Reyes-Bueno, D. Sanmartin and D.A. Donoso. 2015. Mapping continental Ecuadorian ant species. Sociobiology. 62(2): 132–162. doi: 10.13102/sociobiology.v62i2.132-162

Silva, R.R., R.M. Feitosa and F. Eberhardt. 2007. Reduced ant diversity along a habitat regeneration gradient in the southern Brazilian Atlantic Forest. Forest Ecology and Management. 240: 61–69. doi: 10.1016/j.foreco.2006.12.002

Silva, R.R., R.M. Feitosa, C.R.F. Brandão and V.L. Freitas. 2013. The first Leptanilloides species (Hymenoptera: Formicidae: Leptanilloidinae) from eastern South America. Journal of Natural History 47: 2039–2047. doi: 10.1080/00222933.2012.763058

Silva, T.S.R. and C.R.F. Brandão. 2014. Further ergatoid gyne records in the ant tribe Dacetini (Formicidae: Myrmicinae). Neotropical Entomology 43(2): 161–171. doi: 10.1007/s13744-013-0192-7

Souza, J.L.P., F.B. Baccaro, V.L. Landeiro, E. Franklin, W.E. Magnusson, P.A.C.L. Pequeno and I.O. Fernandes. 2016. Taxonomic sufficiency and indicator taxa reduce sampling costs and increase monitoring effectiveness for ants. Diversity and Distributions 22(1): 111–122. doi: 10.1111/ddi.12371

Suguituru, S.S., D.R. Souza, C.B. Munhae, R. Pacheco, M.S.C. Morini. 2013. Diversidade e riqueza de formigas (Hymenoptera: Formicidae) em remanescentes de Mata Atlântica na Bacia Hidrográfica do Alto Tietê, SP. Biota Neotropica 13: 1–11. http://www.biotaneotropica.org.br/v13n2/en/abstract?inventory+bn00813022013

Ulysséa, M.A. and C.R.F. Brandão. 2013. Ant species (Hymenoptera, Formicidae) from the seasonally dry tropical forest of northeastern Brazil: a compilation from field surveys in Bahia and literature records. Revista Brasileira de Entomologia 57: 217–224. doi: 10.1590/S0085-56262013005000002

Vasconcelos, H.L. and J.M.S. Vilhena. 2006. Species turnover and vertical partitioning of ant assemblages in the Brazilian Amazon: a comparison of forests and savannas. Biotropica 38: 100–106. doi: 10.1111/j.1744-7429.2006.00113.x

Vasconcelos, H.L., J.M.S. Vilhena, C.G. Facure and A.L.K.M. Albernaz. 2010. Patterns of ant species diversity and turnover across 2000km of Amazonian floodplain forest. Journal of Biogeography 37: 432–440. doi: 10.1111/j.1365-2699.2009.02230.x

Vasconcelos, H.L., J.M.S. Vilhena, W.E. Magnusson and A.L.K.M. Albernaz. 2006. Long-term effects of forest fragmentation on Amazonian ant communities. Journal of Biogeography 33: 1348–1356. doi: 10.1111/j.1365-2699.2006.01516.x

Vicente, R.E., J. Dambroz and M. Barreto. 2011. New distribution record of *Daceton boltoni* Azorsa and Sosa-Calvo, 2008 (Insecta: Hymenoptera) ant in the Brazilian Amazon. Check List 7: 878–879. doi: 10.15560/7.6.878

Vicente, R.E., W. Dáttilo and T.J. Izzo. 2012. New record of a very specialized interaction: *Myrcidris epicharis* Ward 1990 (Pseudomyrmecinae) and its myrmecophyte host *Myrcia madida* McVaugh (Myrtaceae) in Brazilian Meridional Amazon. Acta Amazonica 42(4): 567–570. doi: 10.1590/s0044-59672012000400016

Vicente, R.E., W. Dáttilo and T.J. Izzo. 2014. Differential recruitment of *Camponotus femoratus* (Fabricius) ants in response to ant garden herbivory. Neotropical Entomology 43(6): 519–525. doi: 10.1007/s13744-014-0245-6

Vicente, R.E., L.P. Prado and R.C.L. Santos.2015. Expanding the distribution of the remarkable ant *Gnamptogenys vriesi* Brandão & Lattke (Formicidae, Ectatomminae): first record From Brazil. Sociobiology 62(4): 615–619. doi: 10.13102/sociobiology.v62i4.920

Wilson, E.O. 1953. The ecology of some North American dacetine ants. Annals of the Entomological Society of America 46: 479–495.

Author contributions: LPP wrote the text, checked MZUSP collection, imaged *Strumigenys fairchildi* specimen; REV collected the specimen, checked LEC/UFMT collection and wrote the text, TSRS identified the ant species, checked DZUP collection and reviewed the text, JLPS checked INPA collection and reviewed the text.

Received: 15 November 2015
Accepted: 15 June 2016
Academic editor: Luiz Alexandre Campos